NRT M-factor delivery document 02 Jun 2008

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1 Content

This document describes the m–factor dataset, produced by ife/Bremen according to m–factor tech-note [1]. M–factors for the calibration light path (M_CAL), the limb light path (M_DL) and the nadir light path (M_DN) to the science detectors are included. All other m–factors are set to the default value of 1.0, i. e. have no effect. The m–factors are delivered as auxiliary files as defined in the SCIAMACHY IODD [2]. M–factor version is 06.01.

This document describes a delivery within the near real time (NRT) setup of the Envisat ground segment. A delivery is foreseen every 7 days, it contains the calculated data for the past 7 days (including the current day) and an extrapolation for the next 7 days. In nominal case, the extrapolated m–factors will not be used. They are available in case of an early start of the level 1–2 processing or an delay in the m–factor delivery. The current package contains m–factors for:

- Calculated: 27 May 2008– 02 Jun 2008
- Prediction: 03 Jun 2008– 09 Jun 2008

Note: If there is no appropriate monitoring measurement for the delivery day available at the time of calculation, also the nominal calculated m–factors may contain predicted values. Especially for M_DN this will be the case, as the corresponding measurement is performed only every 3 days.

2 Delivered files

Table 1 gives the MD5 sums (md5 text mode) [3] and the names of the delivered m-factor files.

Table 2 gives information, how the file content is calculated: Based on actual measurements (*meas.*), an interpolated m–factor (*interp.*) or a predicted, i. e. extrapolated m–factor value (*pred.*) for three light paths.

Table 1: MD5 sum and filename of the delivered m-factor files.

md5-sum	m-factor auxiliary file
012a3eb34afb65d0cf13ca48ba95653f	SCI_MF1_AXNIFE20080602_215450_20080527_193711_20080529_193711
fdf3b46986a3a90470a796f1e8c86cad	SCI_MF1_AXNIFE20080602_215450_20080528_190534_20080530_190534
4b69330344a79d0df5add1c643948ebd	SCI_MF1_AXNIFE20080602_215450_20080529_183357_20080531_183357
f9c8bc54e5e99da82666afef791594c3	SCI_MF1_AXNIFE20080602_215450_20080530_194256_20080601_194256
442d336238e2870d8571c36471074485	SCI_MF1_AXNIFE20080602_215450_20080531_191119_20080602_191119
0bfd4993213946a7642b7cc117c85ea2	SCI_MF1_AXNIFE20080602_215450_20080601_183942_20080603_183942
58a523105e74b3af4babe4d1b84fc3f4	SCI_MF1_AXNIFE20080602_215450_20080602_194841_20080604_194841
f1c87983c83133b4285e1e52000f7c41	SCI_MF1_AXNIFE20080602_215450_20080603_191704_20080605_191704
c979be0ad92df2ca69291d47c60a8d69	SCI_MF1_AXNIFE20080602_215450_20080604_184527_20080606_184527
3be95b2440072005627a54623c3581e6	SCI_MF1_AXNIFE20080602_215450_20080605_181350_20080607_181350
55c103c077d07752809228b13737e80e	SCI_MF1_AXNIFE20080602_215450_20080606_192249_20080608_192249
0694c1864869f3f3a200a0de15fbefd3	SCI_MF1_AXNIFE20080602_215450_20080607_185112_20080609_185112
64ee770216db0717c8c8d22d33f29cfd	SCI_MF1_AXNIFE20080602_215450_20080608_181935_20080610_181935
4787e8e34a46d8745f016098a7e98958	SCI_MF1_AXNIFE20080602_215450_20080609_192834_20080707_192834

Table 2: Source information for the individual m–factors of the delivery set.

validity identifier	M_CAL	M_DL	M_DN
20080527_193711_20080529_193711	meas.	meas.	meas.
20080528_190534_20080530_190534	meas.	meas.	interp.
20080529_183357_20080531_183357	meas.	meas.	interp.
20080530_194256_20080601_194256	meas.	meas.	interp.
20080531_191119_20080602_191119	meas.	meas.	meas.
20080601_183942_20080603_183942	meas.	meas.	pred.
20080602_194841_20080604_194841	pred.	pred.	pred.
20080603_191704_20080605_191704	pred.	pred.	pred.
20080604_184527_20080606_184527	pred.	pred.	pred.
20080605_181350_20080607_181350	pred.	pred.	pred.
20080606_192249_20080608_192249	pred.	pred.	pred.
20080607_185112_20080609_185112	pred.	pred.	pred.
20080608_181935_20080610_181935	pred.	pred.	pred.
20080609_192834_20080707_192834	pred.	pred.	pred.

3 Content check

M–factors describe the degradation of the instrument and are used to compensate for it in the radiometric calibration. Fast changes with time are not expected, i. e. the ratio $M_{ratio,t}$ of m–factors M_t this delivery to the m–factor M_{t_0} of the previous delivery day should be close to 1. The ratio $M_{ratio,t}$ and its reciprocal value should not exceed a

Table 3: Detector pixels used for the calculations described in this document. SCIAMACHY has 8 channels with 1024 pixels per channel. The pixel range is given as the first and last pixel in each channel. For channel 2, the pixel number is given in wavelength order, i. e. the pixel numbers are already reversed.

channel	1	2	3	4	5	6	7	8
pixel	197	1140	2131	3117	4151	5226	6154	7178
range	784	1859	2943	3925	4863	5914	7157	8181

Table 4: Content check results.

	max. ratio (ch. 6/7: median)			mean ratio				
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN	limit	status
1	1.0057	1.0101	1.0140	1.0012	1.0030	1.0049	1.0400	OK
2	1.0016	1.0039	1.0062	1.0007	1.0012	1.0022	1.0200	OK
3	1.0009	1.0020	1.0020	1.0003	1.0004	1.0004	1.0100	OK
4	1.0008	1.0007	1.0006	1.0002	1.0002	0.9999	1.0100	OK
5	1.0009	1.0016	1.0007	1.0001	0.9992	1.0000	1.0120	OK
6	1.0018	1.0023	1.0008	1.0007	0.9989	0.9999	1.0100	OK
7	1.0008	0.9997	0.9994	–	–	–	1.0070	OK
8	1.0013	1.0003	1.0003	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \qquad \text{with} \quad M_{ratio,i} < l \qquad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

This limit is defined for each channel. The limits are derived from a time-series of deliveries simulated for 2007 [1]. For channel 1 to 6, each individual pixel for each dataset has to meet the criteria. Channel 7 and 8 are the infrared detectors with a varying number of bad or dead pixels with unpredictable behavior. A criterion for each pixel is not applicable, therefore a median over the channel is used as $M_{ratio,t}$ and has to meet the criteria. Blind pixels, the overlap regions and channel 6+ are excluded from the calculations, see table 3.

The previous delivery day t_0 is 26 May 2008, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20080526_215354_20080526_182812_20080528_182812` .

Table 4 summarizes the results for this delivery. Also the settings for the limit are given. For information only, also the mean ratio is given. *OK* in the last column means, that the criteria is fulfilled for the channel.

This delivery is within all limits and can be used.

4 Visualization of content check

Figure 1 shows the ratio $M_{ratio,t}$ for all delivered m–factors for each channel. The grey boxes visualize the maximum ratio allowed.

References

[1] Bramstedt, K, Calculation of SCIAMACHY M-Factors, *Technical note*, IFE-SCIA-TN-2007-01-CalcMFactor, Issue 1, ife Bremen, 2008.

[2] Balzer, W, and Slijkhus, S, *Technical document*, SCIAMACHY Level 0 to 1b Processing Input / Output Data Definition, ENV-TN-DLR-SCIA-0005, Issue 5, DLR Oberpfaffenhofen, 2000.

[3] RFC 1321 - The MD5 Message-Digest Algorithm, *Internet RFC/STD/FYI/BCP Archives*, 1992

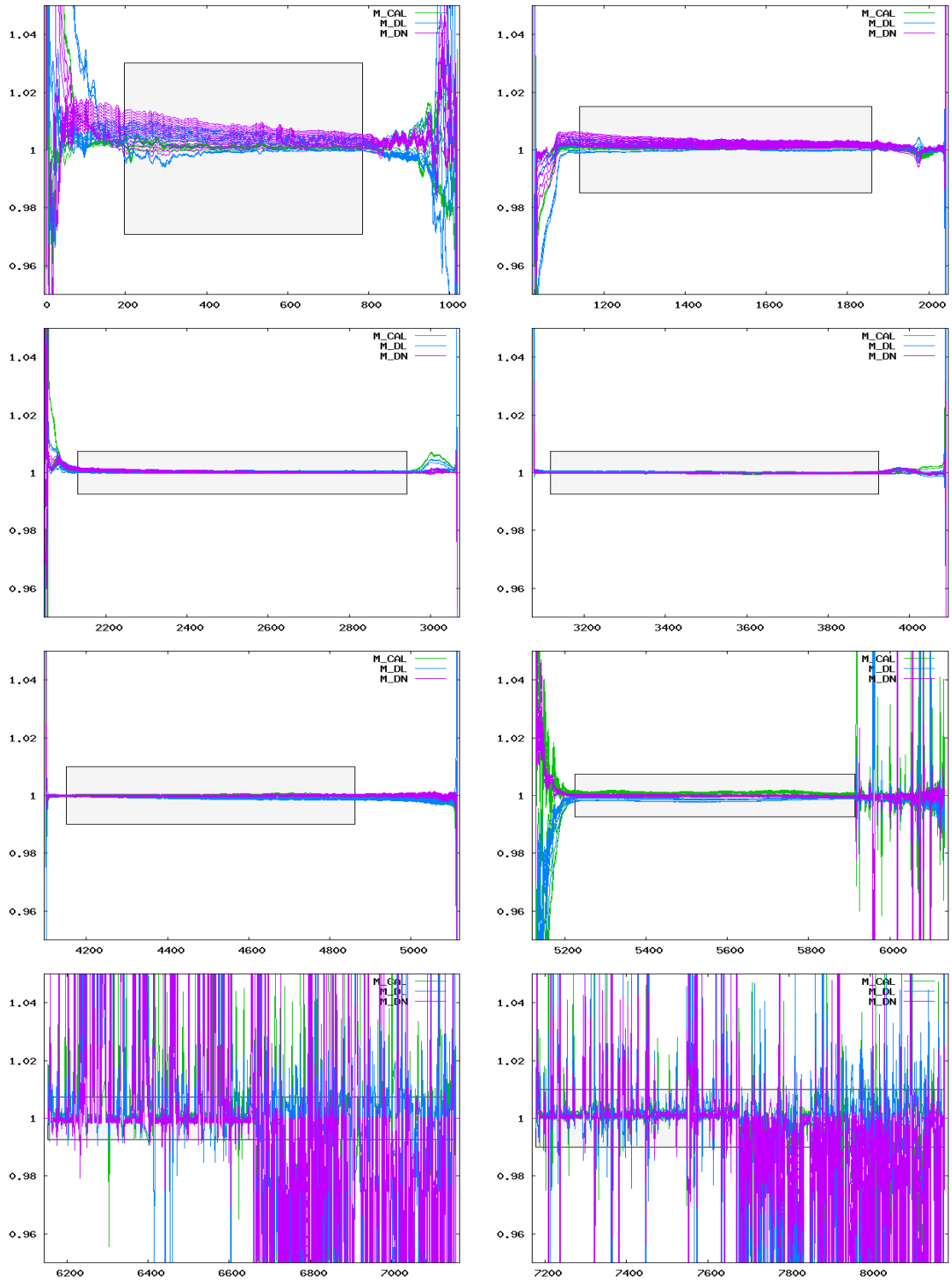

Figure 1: Ratio of delivered m-factors (27 May 2008– 09 Jun 2008) to the corresponding m-factor of the previous delivery day (26 May 2008). The grey boxes visualize the maximum ratio allowed.